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Some principal comments about the purpose of the revised resolution

1. What is the role of this resolution in the hierarchy of IHO Standards? At present the text of this resolution 3/1919 is quite widely repeated in S-4. I have understood that resolution 3/1919 was originally for fundamental definitions. For instance the international definition for nautical mile was for decades given in resolution 3/1919. Should we in TWLWG concentrate to science based definitions of the vertical reference levels and leave the practice how to use these levels in hydrography and cartography to be described in S-4 and S-44? Now it is said in 3/1919 that heights on shore …etc should be referred to HW datum. Would it be better, if 3/1919 should define only what is the HW datum and in S-4 they would say that what is referred to this HW datum? I am not proposing that we should change this text for tidal areas now, but when we write new definitions for non-tidal and inland waters we should concentrate only datum definitions.

2. It is my opinion, that the resolution should be clearly divided into three parts so that the user in (for instance) inland waters need not to read all and then compare what is essential to him. In principle there is something common with tidal waters and inland waters, but non-tidal waters, which could be seen as in between these two is however totally different case.

3. It is my opinion that for non-tidal waters there should be only one vertical reference level in use on charts.

The trivial solution would be MSL, but because the accurate realization of the MLS includes some difficulties (see our new proposal for MSL in S-32), the MSL could be replaced with some other datum, which is close enough to true mean level, but has more accurate realization available on all areas of coastline of that particular sea area.

For the cartographer this principle would mean that everything should be referenced to this one and only datum. The HW which was defined for obstruction clearances about 15 years ago would not be valid any more. Some countries have adopted this HW datum, some not. You may well guess that Finland has not. There is some extra margin in our clearances, but no HW-datum has ever been defined.

My opinion is based on the fact that, when the mariner on non-tidal waters has to be aware that water depth is often less than charted, maybe even 1 meter less, he should also be aware that obstruction clearance may be less than charted. The lesson for mariners is that they should ask for real-time water level data or have sufficient margins for both directions. (Navigation warnings are broadcasted on the Baltic Sea area if the water level is very low (lower than -50 cm?)

4. Inland waters. We should present LW and HW system as a principal solution. But we should not state that it is the only possibility. There are several large lakes in the world, where the seasonal variations of the water level are quite small. The variations of the water level have mainly a meteorological origin. The circumstances are much similar as in the Baltic Sea. The Great Lakes of US-Canada is the most important example. There exists a well-defined geodetic height datum for the whole area. As I have understood there is a chart datum, which is 1 feet below the MWL of the lake. Seasonal variations will only seldom go lower level than this datum, but effects of wind and air pressure may cause larger variations. I am not a specialist of that area but there is also for instance Lake Ladoga which behaves similarly like the Baltic Sea.

We should allow the use of only one datum on lakes (allow the systems which have been established earlier).

The proposed text of Resolution 3/1919, as amended

I do not want to make a proposal for the text now. I would like to hear your comments to the remarks and principles I have presented above.

I would like to present several comments to the various details of the resolution. For that I have used the version of our discussion last autumn. This version came from Brazil 23 October 2012 and it includes the proposals made by Australia.

Comments:

a) Chapter 2 is very clear. This is mandatory. But I cannot understand why many of us are against any explanations. It is allowed to declare **The Chart Datum is the zero level of EVRS2007** (European Vertical Reference System). Mariners may be very delighted on such accurate and definitive definition!!???. I would like to add **"In the area of this chart the Mean Sea level is 18 cm above Chart Datum."** Then few years later this cm-value would change to 17 cm (if the chart is from the Bay of Bothnia area). It might be that S-4 is not favour to such explanations. Of course, if the chart datum is MSL then there is no sense to introduce what are the differences compared to local land survey datum.

b) Is the delimiting definition between tidal and non-tidal waters clear? It is the traditional definition and do not have better proposal. But we have to remember that mariners cross this delimiting line between tidal and non-tidal and they cannot recognize it. It is not a line plotted to the sea. Normally the mariner has to change the paper chart when crossing the line. And the change is printed on chart. But ECDIS/ENC do not give any warning about the chart datum change. In fact even the possibilities to name this attribute are limited and almost funny in S-57 definitions. In the eastern part of the Mediterranean the tidal range is close to this delimiting value and the selections between neighbouring countries vary. Should TWLWG have consultations about this problem with other WGs.

c) Chapter 8. Why to mention all these different objects (depths, heights …) in the beginning. We could say: **In non-tidal waters the MSL or other … datum is the only datum for all vertical measures.**

What is the maximum difference acceptable by Hydrographic Office between the selected Chart Datum and assumed MSL? As an example, if (when) EVRS will be the Chart Datum in the Baltic sea, this maximum difference will be 20 cms in the eastern part of Gulf of Finland. MSL is above the Chart Datum. I would guess that the 6/94 % percentiles are about - 60 cm and + 80 cm compared to the MSL. Do we mislead people if we speak about mean sea but the truth is 20 cm different? This difference is to the safe direction when compared to the mean sea assumption.

There is a note after Chapter 8. The requirement for the well-defined geodetic is O.K. but the latter part is a paradox. As mentioned earlier, the true MSL is difficult to define and even more difficult to realize. We have only the choice between well-defined geodetic datum or more or less accurate approximation of the MSL by MWL, which is based on more or less satisfactorily observed water height series. The dilemma is that the better geodetic reference we have on the area that much better is also our understanding about the MSL along the long coastline or on opposite sides of a bay. MSL is always tied to location. The differences in geoidal heights between two local MSL values are easy to measure if one has a well-defined geodetic reference. But the explanation for these observed differences may be complicated.

d) Chapter 9 not needed, if we accept that there is only one datum for non-tidal waters. Of course, if there would rise in the future the need of some other reference level, TWLWG should then propose a clear and unique definition of the datum for this purpose INLAND WATERS

e) Chapter 10. Once again, shall TWLWG order about the use of certain Datum.

f) Chapter 11 and 12

- seasonal variations are the dominant effect on water level, this is true. (However very large lakes may be an exception.)

- should we note the concept of navigational season? If the lake is frozen in the winter and the yearly lowest value is most probably reached also during winter, this must have effect on the selection of LW. Also it is possible that for the certain period of year an inland water route is not navigable because the water level is too low.

- some inland waters are regulated. Usually there exists a (court) decision of the allowed minimum and maximum level. These limits may be separate for the navigational season than outside the season. In this case the selection of LW and HW is self-evident.

- in some cases the infrastructure has already been built. There are dredged channels and locks. Ships have regular traffic through the area. The LW and HW has been already selected. If the LW does not fulfil the requirement of 0-6 % percentile it has to be accepted anyway. Traffic has some trouble if water descends below the LW, but navigational warnings is the normal practice then.

My proposal is, that in the text of the Resolution, we make it clear, that the method of 0-6 and 94-100 percentiles are for the establishment of a new datum. We should try to make this within one chapter for both LW and HW.

Then we might make a note*: If there exists an older decision of LW and HW datums or a decision that only one datum shall be used, these should be preferred. A clear description of datums shall be presented as stated in Chapter 2. This description shall include information about the available real time water level data sources.*